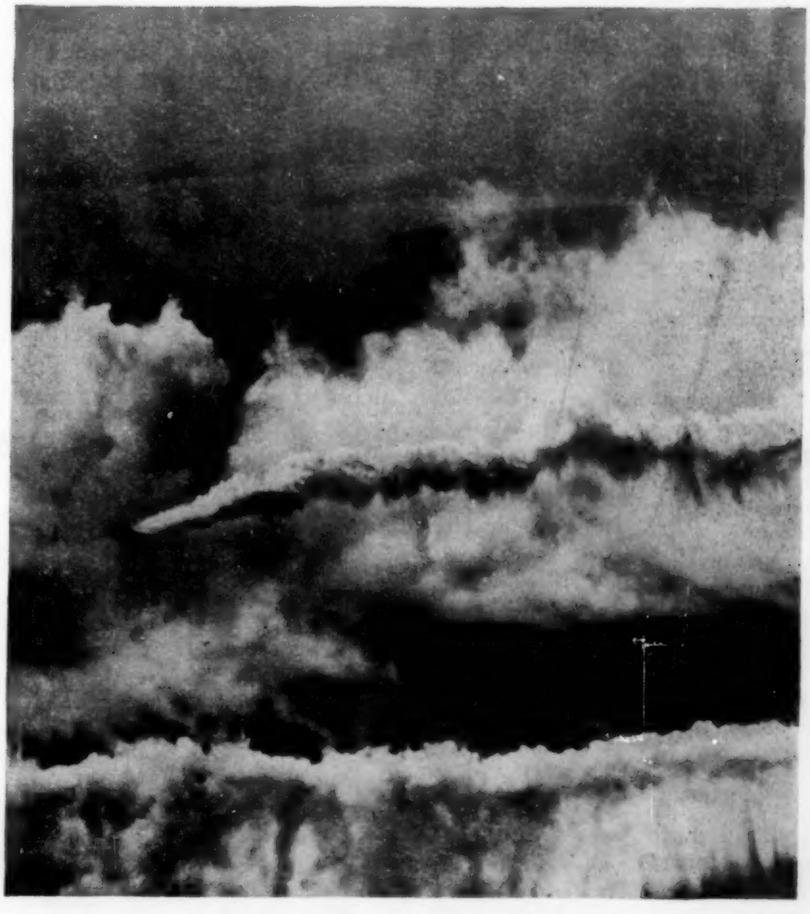
SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

$5 a year 15c a copy Dec. 1, 1928



(Official Photograph, U. S. Army Air Corps)

SMOKE SCREENS TO CUT OUT SUNLIGHT

Newest Way of Starting Plagues

(*See page* 333)

Vol. XIV *No. 399*

The Farm a Chemical Factory

Chemistry

By Edwin E. Slosson

Every farm is a chemical factory and always has been. But it has never yet been brought under the control of the chemist, consequently it lacks flexibility in the adaptation of its products and it loses heavily from waste.

I venture as my first forecast that the farmer of the future will stop, to a large extent, raising field crops as such. He will raise raw materials. He will aim to produce carbohydrates, fatty acids, amino-acids and heterocyclic compounds, rather than raise sugar beets, cotton seed, beef and tobacco. He will employ whatever plants will give, in his locality, the largest yield at the lowest cost of the particular class of chemical compounds that are most in demand at the time.

The farmer of the future will not confine himself so largely as in the past to the production of foods. For there is a limit to this market. We ought not to eat any more than we do and we ought not to waste as much as we do. Even if the highways are lined with illuminated billboards beseeching or commanding us to "Eat more wheat", "Eat more raisins", "Eat more apples", "Eat more potatoes", and "Eat more peanuts", we cannot follow all this gratuitous advice. My grandfather used to say to me when I overloaded my plate with some food I liked: "My boy, your eye is bigger than your stomach." But that is only true of eating. Our stomach for automobiles, radios, silk stockings and newspapers seems insatiable. Therefore, the farmer longs to get out of food production and into a field where the opportunity for high-powered salesmanship is unlimited.

Further, I venture to say that the farmer of the future will find it worth while to make the lower forms of life work for him. He has hitherto regarded molds and maggots, bacteria and fungi in the light of enemies to be eradicated. He may turn them into his slaves, as in the early days of husbandry the wolf was converted into the shepherd dog. Such minute creatures grow faster, live cheaper, require less room and reproduce more rapidly than the higher plants and animals. Microbes that double in size and number every twenty minutes beat Belgian hares in the art of multiplication. Starting with sawdust or waste molasses and ammonia made from the air, it is possible to make all manner of fats and proteins and flavors by the aid of micro-organisms. Already this field is being entered. I have taken at my table a broth from yeast that could not be told from the best beef tea. Can the cattle business compete with the yeast plant? I visited recently a mold factory run by the U. S. Department of Agriculture where glucose was being converted quantitatively and in quantity into gluconic acid. Hitherto gluconic acid has been sold at about $100 a pound, or rather priced at that, for the demand was limited. By this new process it may be made for 35 cents a pound. All that is needed to make the process profitable is to find a market for gluconic acid by the ton, when it could not be sold by the gram.

I have never been one of those chemists, like Berthelot, who foresee a time when all our food will be synthetic. I do not anticipate the day when we shall do away with our three meals and simply swallow a pill containing the essential elements and energy. Such a condensed diet would, it seems to me, be a hard pill to swallow, for it would have to have a density surpassing platinum, even approaching the specific gravity of the faint companion of Sirius.

I believe that the bulk of our food will continue to be raised by the aid of vegetation and that while it may be possible to make any kind of food from coal, air and water with certain salts, I doubt if it will be generally profitable to do so. So I anticipate that the future rivalry between the chemist and the farmer will turn out a drawn game, and result finally in some system of mutual cooperation, a sort of symbiosis to the profit of both parties.

Science News-Letter, December 1, 1928

In This Issue—

Science News-Letter, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

Advertising rates furnished on application.

Interpreting week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable typography and the most convenient arrangement.

The *clippability, indexing,* and *automatic dating* of each article are unique features.

This is a *separable magazine.* Each original article can be clipped or torn out without losing or damaging another important article on the other side. These original articles are backed by reprinted quotations or excerpts, short one-sentence items, advertisements, and other material not likely to be clipped and preserved.

Each article is automatically *indexed* by the key word printed in italics just below the heading, or at the end of the article when the article has no heading. Articles can thus be filed easily into any system of classification, whether it be Library of Congress, Dewey, or one of the reader's own devising.

Each article is automatically *dated* by its last line.

All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

What Plague Will Follow the Next War?

Hygiene

ASIATIC CHOLERA, one of the scourges of ancient times, is caused by these cork-screw-shaped organisms

By Jane Stafford

Suppose another world conflict with its marching hordes, strife and death, overtakes us. What then will follow and blast the health of the earth's teeming millions?

A new plague of germs, made more deadly by evolution's transmutation. An epidemic of insanity, like shell shock, conquering the civilian population. An epidemic of vitamin hunger. A new disease of nutrition that will fell thousands. A pestilence of the air, brought by winging planes that deal death in a new form as they drop bombs and poison gases and blockade the sun's rays with smoke screens.

Such are the cold-blooded, conservative estimates, deliberately made by public health experts who are calmly considering possibilities and carefully laying plans for defense, just as are military and naval experts.

For there will surely be another dreadful plague. Some pestilence will overwhelm the earth, cutting down the population and weakening those who are left by disease and hunger and want.

If men have learned anything from the past they have learned that following every great war came a great epidemic. Plague and cholera followed the Crusades when West fought East for possession of Palestine. Plague and smallpox and typhus fever followed the wars between England and France that gripped Europe for a hundred years. Our own Civil War was followed by such disease that the numbers who died in hospitals of sickness far outnumbered those who were shot and died in battle. Even as late as the Spanish-American and Boer Wars typhus fever and typhoid and dysentery devastated the ranks of both troops and civilians.

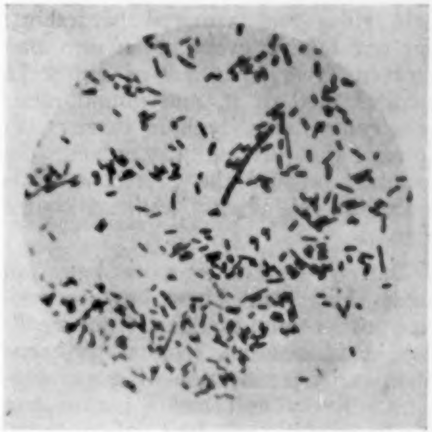
The World War was the first in history in which the number killed by shot and shell exceeded the number who died of disease and pestilence. A triumph indeed for medical and sanitary science, which physicians and public health surgeons are anxious to see repeated after the next great conflict.

So, while military experts are planning fleets of airplanes, these other experts are wondering what the effect of thousands of these planes will be on the earth's population.

Great smoke screens, laid by planes, might keep the sun's beneficent rays from a locality for protracted periods. The harm this would do may be conjectured by considering the present condition of industrial workers in large cities, particularly in England, where they are deprived of sunshine most of the year. Immigration officials who examine thousands of people annually, have noticed that immigrants from Liverpool, for instance, almost all have false teeth, even young men and women 21 or 22 years old.

If airplanes blockade a country from the sun, the children of that country will grow up, if they grow at all, with weak, malformed bones and brittle, decaying teeth. To prevent such a possibility, scientists are at work, standardizing cod-liver oil, the bottled sunshine, and experimenting with lamps that produce artificial sunlight. These measures of substituting sunlight are being used now for children and adults who are sick or have been deprived of their due amount of natural sunlight. In the event of war, such measures would need to be expanded to embrace an entire nation, perhaps.

Another danger from planes is the possibility of disease as a result of exposure to irritating chemicals spread over a city. Fancy living in an atmosphere like that of a railway tunnel for weeks at a time. Besides the discomfort, the air passages, always delicate and easily injured, would suffer lasting harm. Tuberculosis would probably follow such irritation of the lungs. If the irritating substance did not penetrate to the lungs, it might cause disease of the bronchii, which are the tubes leading to the lungs. Or people might become permanently hoarse and speechless as a result of injury to the larynx.



WHEN TROOPS DIED from dysentery, it was often due to these bacilli in impure water and food supplies

The great plagues of the past have all been germ-borne. As soon as scientists learned the germs of the diseases, and how to kill them or keep them away from man or how to protect man from them by vaccines and antitoxins, the danger of world wide plagues disappeared. The reason such plagues have followed wars is that they have followed the lines of travel. Citizens visiting military encampments or returning soldiers brought the disease germs with them. They carried the germ that causes typhus fever in the lice on their bodies, they brought germs of typhoid fever and dysentery in their intestines and spread them with their body discharges. They brought germs of cholera and smallpox and venereal diseases which they passed on to the civilian population at home. And because scientists were still groping in the Dark Ages of Science these diseases spread and spread and killed hundreds of thousands of people, many more than ever died of wounds or were shot in the wars.

When the Crusaders went to Palestine they knew how to fight with sword and buckler, but they didn't know a thing about sanitation or how to keep a pure water supply. They didn't even have such things at home, so how were they to maintain them when away fighting? (*Turn to next page*)

What Plague Will Follow the Next War?—*Cont'd*

When American marines and soldiers fought the Spaniards in Cuba, six centuries later, they had Springfield rifles and armored battleships, but one out of every seven men had typhoid fever, one out of every 71 soldiers died of it, and untold numbers came home, typhoid carriers, to spread the disease throughout the country, because the protective antitoxin for this disease was not known then!

During the last war we knew all these things and knew how to protect soldiers and civilians from smallpox by vaccination, from water-borne diseases by purification of water supplies. Every unit had a canvas bag of the precious solution, sodium hypochlorite, a few drops of which made water safe for drinking. There were delousing stations that protected from typhus, there were prophylactic stations for venereal diseases.

Then when everyone thought we were safe, danger came from an unexpected quarter, as danger always does. In a few places cases of influenza of a particularly virulent type broke out, and suddenly the disease spread like wildfire all over the civilized world. Again it was a germ-borne disease, following lines of travel. Again it was a disease of which scientists knew very little, nothing definite about what caused it or how to prevent it, except by complete isolation of all influenza patients.

Just when it seems that science has conquered the bacteria and their relatives that carry disease, new diseases appear. Before 1912 no one knew of tularemia and now it is widespread. Rocky Mountain spotted fever is another new disease. Are new bacteria springing up to take the places of the vanquished? Or are the old ones changing their forms, disguising themselves, only to break out in some new type of disease? The fact that some diseases, like smallpox and scarlet fever and diphtheria, are occurring in milder form points to a change or weakening in the micro-organisms causing the diseases. Some scientists believe the second theory is true and are working now to find proof for it. If they are successful, they will have to work harder than ever to outwit these resourceful organisms, to discover what form each is going to take next and how, in their new, or transmuted, forms, they may be killed or their evil effects neutralized by antitoxins and vaccines.

The stay-at-homes during a war have always suffered from nutritional diseases. All the fresh, nourishing food is devoted to the fighters. In addition, much food is destroyed, wantonly or accidentally. If the next war is so increasingly great in scope as the last one was, this destruction of food will be so great as to cause a widespread nutritional plague.

What if scientists have discovered vitamins in tomatoes and oranges. If tomatoes and oranges are destroyed or captured by an enemy, where will we turn next for our vitamins? Pellagra seems now to be conquered, so does scurvy; so does rickets. That is, scientists have found the causes of these dire diseases and have been able to prevent and to cure them. But they still exist, just as do cholera and plague and typhus fever in various parts of the world. When a great war breaks out and men and women are striving with might and main to defend themselves, who will remember to watch the danger spots all over the globe? Who will remember to see that little children and women who are not useful for fighting get enough vitamins, get fresh fruits and vegetables, get yeast, the pellagra preventive?

But perhaps the greatest menace, one that threatens civilization itself, one that is hardest to prepare for, that will be hardest to combat, is a great plague of some mental or nervous disease. Such a disease seems the most likely candidate for the position of the plague that will follow the next great war.

Rumblings of such a disaster have already been heard. After and during the last war we had a condition called shell shock, though it had mighty little to do with shells and was found, under one name or another, in homes and offices far from the firing line. In fact, it was only when this condition appeared among people who were remote from the fighting that it was recognized for a condition of mental or emotional collapse due to great mental and emotional strain. Broadly, this is hysteria. Its symptoms are many and varied. Lack of emotional stability, lack of mental training are thought to be at the root of it.

The last generation, reared in stolid, prosperous respectability, was in many cases not able to cope with the conditions of the war. The personal conflict of adjustment was too much for that emotional and mental equilibrium. How will the next generation fare in the next war?

Psychologists and psychiatrists, the new order of scientists, are at work now studying the behavior of animals and human beings, both child and adult. They have found many reasons for our conduct under varying situations. They can even predict what we will do under certain conditions. They can show that people of certain intelligence levels will get along well living quiet lives, performing tasks of a routine nature. But when the routine of life is disturbed, by war or sickness or any other outside force, these people collapse, mentally and emotionally. Some of them proceed to almshouses, some to insane asylums, some to jails. Psychologists are even able to predict, to a certain extent, which direction these people will take when the crisis comes. But as yet they have found no sure way of helping them through such a crisis, or of restoring them to normality afterwards.

The danger from such a widespread plague of mental disease becomes greater as the danger from infectious disease lessens. The more people who survive or escape typhus and cholera, the more who will be left to face mental and emotional strain and readjustment.

The great danger is not from the individual who becomes incompetent to earn a living and must be supported by public funds, but from the vast numbers who develop twisted, hideously perverted minds, in whom all moral sense is suddenly lacking, who are ready to commit any crime.

The situation is fairly acute even now. If the barriers of civilization are let down any further, after another war, will there be any civilization left?

We must look to psychologists and psychiatrists to save us from this, as we look to bacteriologists and sanitarians to save us from plagues of typhus, cholera, etc.

They are working hard, these scientists. They are having opposition in many quarters, much help in others. They alone can foretell the plague of the next war. They alone can prevent or check it. These are the possibilities that scientists now see. Preventive work is being done along all these lines.

Coal Research Frees World

Chemistry

By Watson Davis

The elemental independence of modern man and his freedom from the accidental limitations of nature's distribution of natural resources under, on and above the surface of the earth was demonstrated at the Second International Conference on Bituminous Coal held last week under the guidance of the Carnegie Institute of Technology at Pittsburgh.

Oil from coal, coal from oil, coal from wood, edible fats from coal, rubber from coal, burnable gas from water, wood alcohol from coal, lubricants from coal, soap from coal were a few of the possibilities, many of them practical commercial realities, that the coal conference reports added to the more familiar chemical processes of modern industry which now derive perfumes more fragrant than flowers, colors more varied than the rainbow, coke more useful than raw coal, gas more calorific than natural gas and a multitude of other everyday utilities from coal, wood, oil, air and water.

So rapidly is science discovering the secrets of the raw natural materials and their elements that these coal conferences might well be broadened into CHON conferences. Why not a synthetic name for the congresses that contribute so much new knowledge to the present era of the industrial transformations based on chemistry? The chemical symbol, C, for carbon contained in coal, wood and oil, H for hydrogen in hydrocarbons and water as well, O for oxygen most prevalent in the air, and N for nitrogen, four-fifths of air, which is present in all living things and one of the principal constituents of fertilizer. These four chemical elements are the essentials of the vast fuel, coal, oil, wood, organic chemical, agricultural and food industries of the world as well as all forms of life. They exist the whole world over in some form or other. Every country has air and water, certain countries like the United States are blessed with bountiful supplies of easily available C as coal and oil.

From Europe, to this year's coal conference as to the first one in 1926, came the most ingenious and promising methods of converting coal into other things. Dr. Carl Krauch, German Dye Trust chemist, told how through the magic of catalysis and hydrogenation coal is made into gasoline, lubricating oil, kerosene, paraffin, alcohol, fats and nearly any other hydrocarbon that the market may desire. Dr. Friedrich Bergius, the Heidelberg chemist, whose hydrogenation process, first reported to the 1926 coal conference, is now used and controlled by the German Dye Trust, announced the conversion of the cellulose and lignin of wood into artificial coal, the process used by nature millions of years ago in the manufacture of coal. Dr. Fritz Hofmann, veteran German chemist, affirmed but did not explain the production of real rubber from coal. From France and other laboratories in Germany there came papers telling of intensive researching upon the vital problem of making from coal, which Europe has, the gasoline, lubricants, and other products that must at present be imported. Necessity is the reason why this sort of research is more intense in Europe than in America. Our country, richer in natural ready-made products, has devoted its brains and energy to better methods of cracking its petroleum or burning its plentiful oil and coal.

It is significant and encouraging that much of the pure scientific research, the romantic delving into molecular and atomic love affairs, that formed the foundation of European industrial applications was done here in America. Prof. Hugh S. Taylor of Princeton did much pioneer work on catalysis, in which one substance eggs on others to do something without being itself altered.

England has been more interested in the process of coal treatment known as low temperature carbonization. Instead of coking the coal at a high heat, as is done in the familiar by-product coke ovens of America, the volatile matter in the coal is driven off at a much milder temperature, preserving and producing more of the valuable liquid and gaseous products of coal. Low temperature processes are of great interest to America and, in fact, the largest low temperature carbonization plant in the world is now being erected in New Jersey.

Coal production in America has actually decreased in recent years due to the increased use of oil as fuel, F. G. Tryon of the U. S. Bureau of Mines, reported to the conference. And the oil industry is borrowing the latest coal research developments to make its production more efficient. The German methods of liquefying coal have been brought to America and set to work getting a larger percentage of gasoline out of crude oil. A paradoxical development reported to the conference by Prof. Walter F. Rittman of the Carnegie Institute of Technology was the actual commercial production of artificial bituminous coal from crude oil residues as a by-product of the production of gasoline.

Since large amounts of raw coal will still be burned despite the new treatments and transmutations that are possible, new combustion methods are being developed. Pulverized coal has propelled its first sea-going vessel, the S. S. *Mercer,* C. J. Jefferson of the U. S. Shipping Board, and Commander J. J. Broshek of the U. S. Navy told the conference. In Germany an internal combustion engine of the Diesel type has been built to feed on powdered coal. Abroad locomotives fired by coal dust draw trains. Great power plants are being built here and abroad to use the finely divided state of coal.

For power production coal or other combustibles are not a necessity as hydroelectric plants have demonstrated. To the coal conference was reported a power production method that promises to be another fuel competitor. Georges Claude, the French scientist, whose name and genius is associated with ammonia synthesis, liquid air and neon lights, proposes to tap energy of the sea, the temperature falls of the ocean. In Belgium a power plant of sixty kilowatts runs on the temperature drop of thirty-three degrees Fahrenheit. In the warm tropical waters of Cuba, whose depths are always cold, he proposes to build a larger power plant utilizing the free power of the sea's temperature difference. Eventually he foresees Florida and Southern California benefiting from his new invention.

The two years since the first Carnegie coal conference, as summarized in the papers presented this year, exceeded in achievment even the prevision of Dr. T. S. Baker, president of the Carnegie Institute of Technology, whose planning and energy made possible the international conferences. The effects of such vigorous world congresses upon world industry can not be properly appreciated contemporaneously but the (*Turn to next page*)

Once upon a time there was a busy person who, discovering that Thanksgiving was past, began to worry and make out a Christmas list. He was in what the novels call a dilemma. So many figurative stockings to fill! And handkerchiefs, neckties, and the doodads of the department stores seemed so trite and futile.

And then the busy person, leafing over the pages of his favorite magazine for relief and relaxation, came upon this life-saving suggestion:

"Make a year's subscription to the SCIENCE NEWS-LETTER your standard Christmas gift, a 52 time blessing to the recipient. Notification card will be sent to you or directly to your lucky friend. Science Service as its Christmas gift to you offers a reduced price (good until January 1, 1929 only, as they say in the bargain advertisements) of only $8.00 for *two* gift subscriptions, $12.00 for *three* gift subscriptions, etc."

Realizing that this was the happy solution of his difficulty and that he would actually save money, the busy person jotted down the names and addresses in a space like this:

He wrote out his check, mailed it and the list to Science Service, 21st and B Sts., Washington, D. C., and stopped worrying until next December 1.

P. S.—You are invited to do likewise. In spite of the beginning, this is *not* a fairy story.

Coal Research—*Cont'd*

800 representatives of twenty nations attending will take back to their plants and laboratories new ideas and enthusiasms. Those attending the conferences can not help but feel that the prosperity of CHON industries are fully as dependent on science as on economics, if not more so.

An important by-product of the coal conference should be a growing realization that rampant nationalism is as obsolete as the open coal grate. Wars, always wasteful, need not be fought for raw materials. All nations have them in some form. Scientific conquests are more lasting than military successes. At the coal conference Germans, French, English and Americans worked together. The genius of discovery and research in any part of the world in these accelerating days soon conquers the whole globe.

Science News-Letter, December 1, 1928

Since the earthquake of 1923, buildings in Tokyo are limited to three stories in height.

A pneumatic rubber raft for use in flood relief work has been tested by German firemen.

Crocodiles and hippopotamuses were sometimes set to fighting each other in the Roman circus.

Color Snapshots for Amateur

Photography

The amateur photographer will soon be able to make snapshots in natural colors, in his own film camera, and without the need for exposures much longer than he would give with ordinary films. This is the announcement made in *Nature*, by F. J. Tritton. These color films will be on the market within a month or two, he stated.

A triple film makes the new method possible. It forms what is known as the "tripack." In any process of color photography that reproduces all the colors of nature, it is necessary to make separate records of the reds, the greens and the blues in the original scene. One of the first methods of doing this was to make these photographs separately, first exposing a plate through a blue glass filter, which passed only the blue light, and so gave a record of the blues. Similar pictures, on separate plates, were made with green and red filters. By making transparent prints from these, dyeing each with the proper color, and then combining them, a color picture could be obtained. As the separate color pictures had to be made one after the other, the method could not be used for pictures of moving objects, though it is generally used today for making color reproductions in magazines.

With a tripack, three films are used at once. They are really arranged as a sandwich, two films with another between. The front one, in the new method, is sensitive to the blue light; the green and red pass through; the middle one is sensitive to the green, and the red passes through to the back one. Though tripacks have been used before, previously it was necessary to put the red in front and the blue in back. As the blue image is the one chiefly responsible for determining the outlines of the subject, and as the back picture is not as clear as the front one, there was more or less fuzziness of the finished picture. By putting the blue in front, a much sharper picture is obtained.

Mr. Tritton stated that this film could be made with very fast emulsions, so that these color films might be as fast as the average roll film. This would permit color snapshots in ordinary light, and with ordinary cameras, a thing not possible with other methods. As the finishing and printing of the pictures is rather complicated, it is probable that the manufacturers will provide this service.

Science News-Letter, December 1, 1928

50,000,000 Indians in 1200 A. D.

Ethnology

The peak of America's native population, before the white man's coming, was reached about 1200 A. D., when there may have been as many as 50,000,000 or even 75,000,000 Indians in the new world. This is the conclusion of Dr. H. J. Spinden, of Harvard University, reported in the *Geographical Review*.

Dr. Spinden's estimates of the people in prehistoric America take into account the Maya, Aztecs, Incas, Mound Builders, Pueblos, and other races scattered over the western world. At present, the Indian population of North and South America amounts to 26,000,000. About 350,000 of these are in North America north of Mexico.

Epidemic disease brought by the white man has been the chief factor in cutting down the Indians.

"Europeans unloaded upon American Indians a tremendous burden of new infections for which the latter had not the slightest immunity," he states. "Perhaps smallpox comes first as an introduced plague and measles second, this latter malady being deadly for the red man. But in the tropics the debilitation and mortality resulting from the introduction of malaria in three types and hookworm in two are heavy factors. There have been great epidemics of several other diseases, including Asiatic cholera. In recent years trachoma has been a burden among many tribes. High mortality among the aborigines has generally followed the opening up of new territories by the white man."

There were few serious disease forms in America when the Indians lived here undisturbed. Dr. Spinden explains this as partly due to the thin scattering stream of immigration from Siberia into Alaska, as contrasted with the thicker settlements of the Old World, and partly due to the fact that the early Americans brought very few animals to become new sources of infection.

Science News-Letter, December 1, 1928

Nature Ramblings

By Frank Thone

Natural History

Earwig

One of the most curiously misnamed insects in existence is the earwig. Few of us ever get to see earwigs, but that is only because we do not hunt for these curious creatures. Even now, late autumn though it is, we can find them by turning up old boards or stones, pulling cattails to pieces, and by prying into cracks and crannies generally.

The earwig gets its name because of a superstition. It was formerly believed that the insect liked to get into people's ears and thence to bore into their heads—the formidable-appearing pincers carried astern probably lending support to the notion. It is believed that the "wig" part of the name is derived from the same source as our word "wiggle." The belief in the earwig's pernicious activities is not confined to English folklore; its German name translates into "ear-worm," and its French name into "ear-piercer." An early 17th-century book gave a simple though somewhat messy remedy for earwig trouble: "If an earwig be gotten into the eare . . . spit into the same, and it will come forth anon."

The earwig's pincers are not made for any such murderous purpose as our grandsires supposed. They are used by many of the earwig species for unfolding their wings. When the earwig wants to use them he must reach up over his back with his tail-tongs, pull out the tightly packed wings, and straighten them out. Then he is ready to fly.

But the riddle of the earwig's pincers is increased by the fact that certain species with well-developed grippers astern do not need them to unfold their wings. There remains the possibility that in these the pincers are used in the mating activities.

Science News-Letter, December 1, 1928

Keeps Artificial Rubber Secret

Chemistry

Following are additional reports on the Second International Conference on Bituminous Coal at Pittsburgh.

Coal experts who went to the coal conference sessions at Pittsburgh in the hope of hearing how coal could be converted into rubber did not get their curiosity gratified by Dr. Fritz Hofmann of the Coal Research Institute of the Kaiser Wilhelm Association of Breslau who was announced to speak on the enticing topic of "From Coal to Rubber" on the program of the Second International Conference on Bituminous Coal. Dr. Hofmann gave an eloquent address in German on the history of the investigation and its difficulties but conveyed a minimum of information as to the present status of the problem and the most recent steps toward its achievement. He frankly admitted that he did not intend to give away any trade secrets for, as he said:

"In the case of a technically usable rubber synthesis it is not merely a question of general unselfish scientific knowledge. Here values are at stake which force the speaker to weigh every word which he says about these things, for such work involves a risk of millions, and many worries for those who have taken the risk."

For twenty-two years Dr. Hofmann and his corps of collaborators have been engaged in the pursuit of artificial rubber with the liberal backing of the I. G. Dye Industry, the great chemical combine whose initials Americans are apt to translate as the "Industrial Giant." As early as 1909 a successful process was discovered in the laboratory of the Elberfeld Dye Works and before the war five hundred patents had been taken in this field. During the war when Germany was cut off from natural rubber an artificial substitute was manufactured to the extent of 2,500 tons. This product proved satisfactory for hard rubber articles but not for soft, so the German automobiles had to take to tires of steel springs in the later years of the war. But when the price of raw rubber dropped from $3.40 a pound to 16 cents the synthetic could not compete with the plantation product.

Those of the audience who were incredulous of the possibility of producing rubber from coal were invited by Dr. Hofmann to come up on the platform after the lecture where he unpacked from a small box samples of synthetic rubber in thin sheets, thick slabs and rings. These looked like ordinary brown rubber and smelled as bad. The pure product, however, is white and translucent, looking like lumps of camphor. A strip of yellow rubber-covered cloth had been made twelve years ago but was as elastic as a new waterproof coat.

The synthetic rubber is made by condensation and solidification of a light colorless liquid of the same composition called by the chemists "isoprene". This may be made by means of a long series of compounds from the familiar acetylene gas which is prepared from calcium carbide, which is produced by the electrical heating of coke and lime.

Nothing was said in the lecture to substantiate the statement made last year by an official of the I. G. Dye Industry, arousing a sensation in the American press, that their process could produce rubber cheaper than it could be grown on the plantation.

Motor Fuel from Lignite

A new method of making motor fuel and a great variety of other useful carbon compounds was explained at the conference by Director Andre Kling and Subdirector Daniel Florentin of the Paris Municipal Laboratory. By employing high pressures and high temperatures in tight steel retorts, tars from coal and lignite, now mostly burned as fuel for lack of a profitable market, can be converted into salable gasoline and lubricating oil by the addition of hydrogen. By the employment of a suitable catalytic agent such as alumina it is possible to break up molecules or combine them at will to form profitable products. These experiments have been carried out in the laboratory, but have now been transferred to an industrial stage.

Artificial Coal From Wood

Cellulose and lignin, the two principal constituents of wood, have been converted into artificial coals practically identical with natural coal found ready-made in the ground, Dr. Friedrich Bergius of Heidelberg, Germany, announced. In 1926 Dr. Bergius at the first Coal Conference told how he had made synthetic gasoline, oil and other products out of coal and since then the German Dye Trust has utilized his process for producing commercially thousands of tons of synthetic motor fuel.

During theoretical researches upon the constitution of coal conducted from 1910 to 1913, Dr. Bergius first transformed cellulose into coal on a laboratory scale. This accomplishment led to the hydrogenation of coal under high pressure and during the fifteen years of developmental work upon this process further theoretical work on coal formation was not undertaken. In the past year, however, Dr. Karl Schoenemann of the Bergius laboratory has manufactured several pounds of the artificial coal from cellulose and smaller quantities from lignin. Chemical analysis and conversion of the artificial coal into products similar to those produced from natural coal have convinced Dr. Bergius that the substance made from the wood elements is a real coal.

Making of coal from wood and the production of oil from coal provide hints of the processes leading to the formation of these substances in nature.

Converts Petroleum to Coal

Converting petroleum partly into coal as a means of converting it completely into gasoline was the process proposed by Dr. Walter F. Rittman of the Carnegie Institute of Technology in one of the most sensational papers.

This project is not purely theoretical, for Dr. Rittman stated that one important American oil refinery is now manufacturing such synthetic coal at a rate of fifty tons a day and is planning to increase this output to a hundred tons and more. The process pays because of the increasing demand for motor fuel. Next year more than fifteen billion gallons of gasoline will be needed by the thirty million automobiles of America, so every effort will be made to push the cracking process further to increase the yield.

Formerly the fraction of gasoline distilled off was less than a fifth of the crude oil. Nowadays the best refineries get out four-fifths of the oil as gasoline. The residue, consisting of heavy oils contaminated with the lime used in the purification, will only bring from a half cent to a cent and a half as fuel. But in the plant referred to the distillation is carried further and the residue is dumped directly while still very hot and fluid into gondola (*Turn to next page*)

Coal Conference—*Cont'd*

cars, where it solidifies into a sort of artificial bituminous coal. This can be converted into coke by the ordinary ovens, or into gasoline by one of the hydrogenation processes that have been described at this conference by German chemists, Dr. Freidrich Bergius of Heidelberg and Dr. Carl Krauch of Ludwigshafen on the Rhine. Bergius began his attempts to make petroleum artificially in 1910 at what an American would consider the wrong end, that is, by trying to convert wood to coal, which is the geological process. Having by this learned something of how coal is constructed then he was ready to reverse the process and decompose coal in the hope of getting liquid fuel. The success of these efforts is attested by Dr. Krauch, who stated that the Leuna works in Germany are now producing 70,000 tons of synthetic gasoline and plan to produce 250,000 tons next year.

Where to Find Petroleum

Where may we expect to find in the future the petroleum to meet our constantly increasing demand was the vital question tackled by Dr. David White of the U. S. Geological Survey.

He exhibited a map of many colors in which he outlined the areas known to contain oil fields, those regarded as promising in varying degrees and those composed of strata from which no petroleum can be expected. About two-fifths of the area of the United States was classed as Producing, Proved, Promising or Possible. This included, among others, such regions as Kansas, Western Nebraska, Oklahoma, Montana, eastern Colorado, Indiana, Illinois, Mississippi, Louisiana and Texas, extending into the Gulf of Mexico. The black or unpromising portion of the map comprised the ancient igneous, pre-cambrian and metamorphic rocks, such as granite, gneisses and schists, which underlie a wide belt stretching from Maine to Florida, a large area about the Great Lakes and the main Rocky Mountain region between Wyoming and California. This map has been worked out in great detail on the basis of many years study by the Survey and should serve as a good guide to the oil prospector or to the investor in oil prospects.

Science News-Letter, December 1, 1928

Since the earthquake of 1923, buildings in Tokyo are limited to three stories in height.

New Knockless Fuel Promised

Chemistry

Motor fuel that will prevent engine knocking and reduce the fire risk in automobile and airplane accidents is promised as the result of experiments reported by Dr. C. F. Kettering, director of the General Motors research laboratories, who spoke before the recent meeting of the National Academy of Sciences.

Not how light or volatile the fuel is, but what it is chemically determines its explosive properties in internal combustion engines, Dr. Kettering declared. The way in which the molecules of the fuel are put together controls the way in which it will burn within the cylinders.

Ordinary gasoline produces a "knock" in the automobile engine laboring under stress or operated under high compression. The propelling explosive mixture detonates with a bang instead of burning more slowly, smoothly and evenly. Anti-knock preparations, such as tetraethyl lead developed some years ago by Dr. Kettering, are added to gasoline to make it usable in the motors of higher compression and more efficiency.

Not satisfied with having developed the anti-knock fuel industry, Dr. Kettering now promises to supersede it by showing the petroleum producers how to make motor fuel that will not need anti-knock agents added to it. His researches demonstrated that the molecular structure of the fuel, which can be changed during refining, controls its knocking qualities. Only a fifth of the ordinary gasoline sold today need be reformed to make all motor fuel nonknocking. And that is a mere juggling of the molecules.

Once this is generally accomplished automobile manufacturers can equip their cars with more scientific engines that will get the most out of the fuel.

Dr. Kettering's discovery may make unnecessary the development of Diesel type engines for automobiles, airplanes and airships. Because Diesel engines use heavy oil that does not catch fire easily in case of accident they are considered by some engineers to be the logical method of removing the fire risk now present in gasoline propelled cars and aircraft. Since Dr. Kettering demonstrated that an effective motor fuel can be low in boiling point and therefore not easily exploded except under proper conditions in the engine, his research promises to banish the fire danger and the necessity of Diesel engine development on that account.

Science News-Letter, December 1, 1928

Quanta and Proton Fragments

Physics

The new physics that has captured this branch of science in the course of a peaceful revolution begun by Einstein and his famous theory of relativity received more support at the recent meeting of the National Academy of Sciences. To a young scientist in the Bell Telephone Laboratories in New York, Dr. Clinton Joseph Davisson, the Academy awarded a prize conferred only once in five years for "the most important discovery or investigation in electricity or magnetism or radiant energy."

Dr. Davisson is the man who showed about a year ago that streams of electrons shot against certain surfaces will be reflected like light from a mirror. Before his work electrons had been looked upon as matter rather that radiation. This research, coupled with the idea that light and other radiation travels in gobs or chunks, called "quanta," leaves the scientists wondering where radiation begins and matter ends.

The new ideas of mechanics have also thrown new light on the mystery of atomic disintegration that causes radium and a few other elements to break down slowly but surely uninfluenced by any power in the command of man. Profs. Edward U. Condon and Ronald W. Gurney of Princeton reported to the Academy a theory of atomic disintegration that does not require for the heart of the atom a violation of the laws that govern matter in the other parts of the universe. A fragment of the atomic nucleus is able to leak out and fly away at high velocity, whereas former conceptions showed the atom exploding under the influence of strange forces. Even this work does not tell us how to tap atomic energy and harness it.

Science News-Letter, December 1, 1928

Exploration Limited

Geography

Arctic explorers have been getting too numerous in Norway's far northern island possession of Spitsbergen, and henceforward proposed expeditions will have to satisfy the governing body of that region of the seriousness of their intentions and of their competence to take care of themselves in the field, says *Nature*, a leading British scientific journal. The Norwegian government has been forced to this step by the troubles of several expeditions which went in without adequate equipment and had to be rescued at considerable expense.

Science News-Letter, December 1, 1928

Players on many Hawaiian football teams wear no shoes, but stars in the barefoot league can punt 50 or 60 yards and are taught to place kick and drop kick accurately with their bare toes.

Finds Year's Third Comet

Astronomy

The year's third comet has been discovered by David Lamont Forbes, an astronomer at Capetown, South Africa, according to an announcement by Dr. Harlow Shapley, director of the Harvard College Observatory. This observatory acts as a clearing house for news of astronomical discoveries. In accordance with the usual practice, the new celestial visitor will be known after the discoverer as Forbes' Comet.

When first observed, on November 21, Forbes' comet was in the constellation of Corvus, the crow. This is a group that can now be seen from the United States low in the southern sky before sunrise. When discovered, the comet was going in a southeasterly direction, towards the nearby constellation of the centaur, so that it will soon be entirely out of the skies visible from northern countries. At the time of discovery it was of the sixth magnitude, just on the verge of naked-eye visibility on a dark night.

Later observations made by Dr. Berman of the Lick Observatory in California, on November 23, and by Dr. George Van Biesbroeck on November 25, showed that the comet is getting fainter, so that it is probably moving away from the earth.

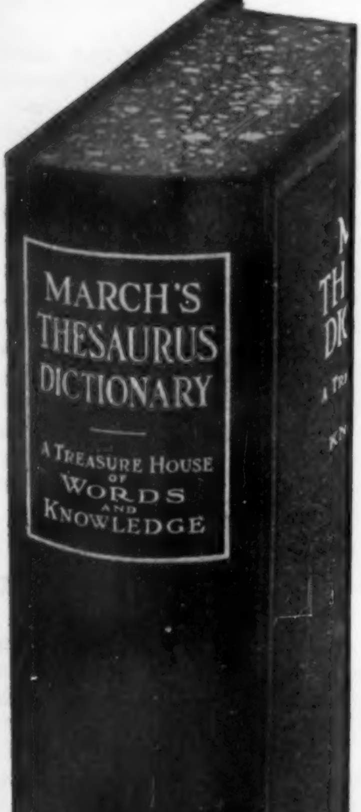
Science News-Letter, December 1, 1928

New Zealand has a suicide rate considerably higher than that in Great Britain.

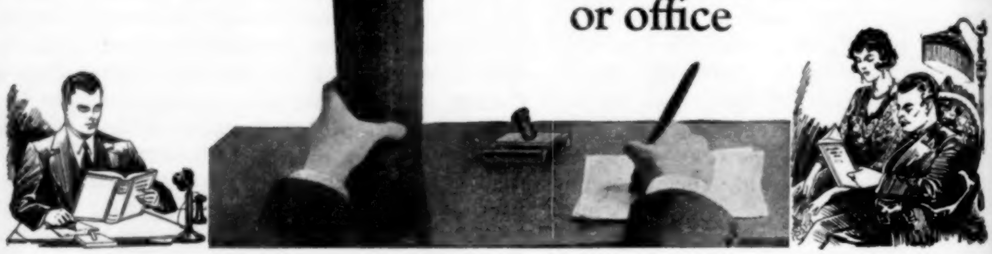
The Whole Language

at your fingertips—

in your home or office



A thesaurus, plus a dictionary, encyclopedic in scope. 1462 pages printed on special thin, opaque paper, 10¼ x 7¼ x 2¾", bound in handsome buckram.



The word expressing some particular shade of meaning or thought, the word you have forgotten, the synonym which enables you to avoid repetition—**the words that will lift your writing and speaking out of the commonplace and give to your thoughts a directness which leaves no doubt of your meaning—**these words are instantly available through this remarkable book.

No more vague expressions and explanations that give you an undeserved reputation for hazy thinking—no more vainly searching through a dictionary for the word you do not know.

Just reach for March, flip over the pages and the word you need is before you, **defined,** and grouped with other words of like meaning, so that you know it is the right word for the purpose, and that you are using it correctly.

If you have tried all of the dictionaries and are still groping for words, turn to

MARCH'S THESAURUS DICTIONARY

In addition to the unique, patented arrangement which has made this book so valuable to the user, this new Amplified Edition is enriched with thousands of facts on words, history, and geography of which you find yourself in frequent need.

It embodies chapters which are complete, concise text books on English grammar, Composition, History of the English Language, Evolution of Writing, word building, Biblical references, literary facts and the important words and definitions from the leading arts and sciences, all material of immeasurable value in your writing, reading and speaking.

It is truly a "Treasure House of Words and Knowledge," a book you will keep on your desk for constant ready reference.

To fully appreciate its helpfulness you must see it and use it.

Take advantage **now** of this opportunity to

Authorities are Saying:

"A real Treasure Chest of 'English undefiled.' We commend it unreservedly."—*Review of Reviews.*

"It not only defines known words but also supplies just the right words you need for each shade of meaning."—*World's Work.*

"— will be of constant use on the writing desk."—*American Mercury.*

"Valued by those who wish to use their mother tongue with accuracy and effectiveness."—*New York Times.*

Examine it at your own home

—at our risk

Let us send you this "Open Sesame" to the language that you may judge its value by actual use.

We want you to examine it at your leisure, use it for ten days, and see for yourself what a complete command of the English language it places in your hands.

Just send in the coupon now. It places you under no obligation since if the book does not meet with your unqualified approval you simply need return it.

Send on Approval Coupon

HISTORICAL PUBLISHING CO.,
Dept. SC-12,
1334 Cherry St.,
Philadelphia, Pa.

Please send me (postpaid in U. S. and Canada) the new Amplified Edition of March's Thesaurus Dictionary. I will pay the postman $3.00 plus 12c. C.O.D. fee and if I keep the book will pay you $2.00 per month for three months. Canada, duty extra; Foreign, $10.00 cash with order.

If for any reason I do not wish to keep it I will return it in good condition within 10 days and you are to refund my $3.12.

Name ....

Address ....

CLASSICS OF SCIENCE: Hydrogen—Inflammable Air

Chemistry

The experiments on hydrogen which Cavendish performed for the first time, here related by him, are now among the first exercises in chemistry for beginners. You can repeat them easily, but it is as well to be as cautious about getting hurt as Cavendish was. Bottles containing hydrogen-air mixtures have been known to break since his time.

EXPERIMENTS ON FACTITIOUS AIR, by the Hon. Henry Cavendish, F.R.S. in Philosophical Transactions of the Royal Society of London, Vol. 56, Read May 29, 1766.

Air from Metal and Acid

I know of only three metallic substances, namely, zinc, iron and tin, that generate inflammable air by solution in acids; and those only by solution in the diluted vitriolic acid, or spirit of salt.

Zinc dissolves with great rapidity in both these acids; and, unless they are very much diluted, generates a considerable heat. One ounce of zinc produces about 356 ounce measures of air: the quantity seems just the same whichsoever of these acids it is dissolved in. Iron dissolves readily in the diluted vitriolic acid, but not near so readily as zinc. One ounce of iron wire produces about 412 ounce measures of air: the quantity was just the same, whether the oil of vitriol was diluted with 1½, or 7 times its weight of water; so that the quantity of air produced seems not at all to depend on the strength of the acid.

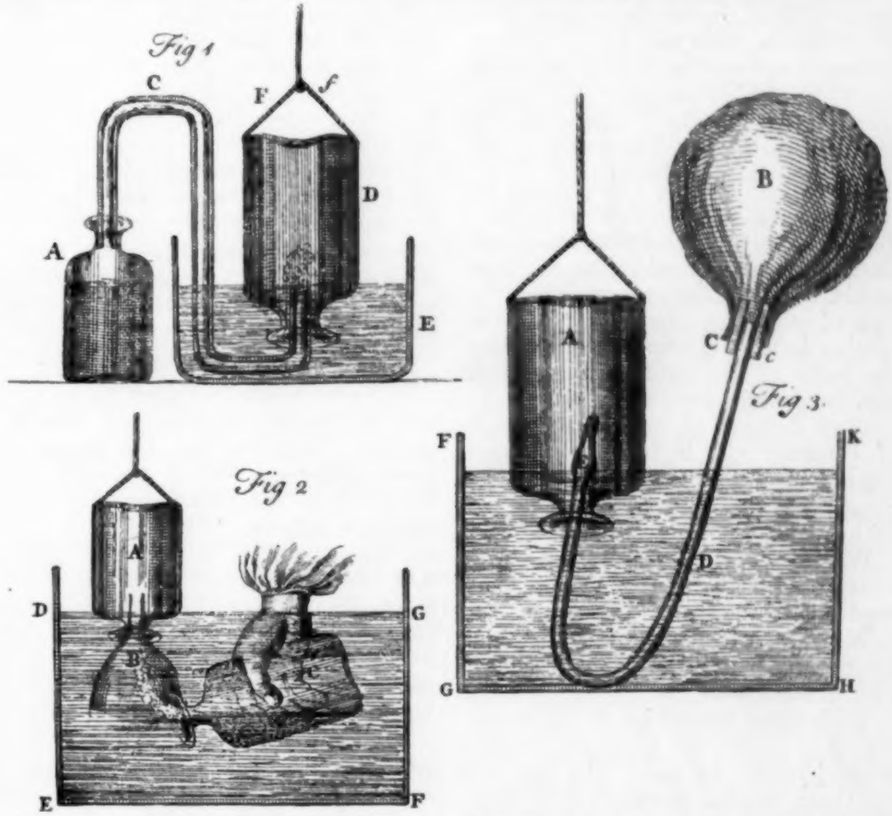
Iron dissolves but slowly in spirit of salt while cold: with the assistance of heat it dissolves moderately fast. The air produced thereby is inflammable; but I have not tried how much it produces.

Tin was found to dissolve scarce at all in oil of vitriol diluted with an equal weight of water, while cold: with the assistance of a moderate heat it dissolved slowly, and generated air, which was inflammable: the quantity was not ascertained.

Tin dissolves slowly in strong spirit of salt while cold: with the assistance of heat it dissolves moderately fast. One ounce of tinfoil yields 202 ounce measures of inflammable air.

These experiments were made, when the thermometer was at 50° and the barometer at 30 inches.

All these three metallic substances dissolve readily in the nitrous acid, and generate air; but the air is not at all inflammable. They also unite readily, with the assistance of heat, to the undiluted acid of vitriol; but very little of the salt, formed by their union with the acid, dissolves in the fluid. They all unite to the acid with a considerable effervescence, and discharge plenty of vapours, which smell strongly of the volatile sulphurous acid, and which are not at all inflammable. Iron is not sensibly acted on by this acid, without the assistance of heat; but zinc and tin are in some measure acted on by it, while cold. . . .



APPARATUS FOR PRODUCING INFLAMMABLE AIR and weighing the sample collected

Inflammable Air

I now proceed to the experiments made on inflammable air.

I cannot find that this air has any tendency to lose its elasticity by keeping, or that it is at all absorbed, either by water, or by fixed or volatile alcalies; as I have kept some by me for several weeks in a bottle inverted into a vessel of water, without any sensible decrease of bulk; and as I have also kept some for a few days, in bottles inverted into vessels of sope leys and spirit of sal ammoniac, without perceiving their bulk to be at all diminished.

It has been observed by others, that, when a piece of lighted paper is applied to the mouth of a bottle, containing a mixture of inflammable and common air, the air takes fire, and goes off with an explosion. In order to observe in what manner the effect varies according to the different proportions in which they are mixed, the following experiment was made.

Some of the inflammable air, produced by dissolving zinc in diluted oil of vitriol, was mixed with common air in several different proportions, and the inflammability of these mixtures tried one after the other in this manner. A quart bottle was filled with one of these mixtures, in the manner represented in Fig. 2. The bottle was then taken out of the water, set upright on a table, and the flame of a lamp or piece of lighted paper applied to its mouth. But, in order to prevent the included air from mixing with the outward air, before the flame could be applied, the mouth of the bottle was covered, while under water, with a cap made of a piece of wood covered with a few folds of linen; which cap was not removed till the instant that the flame was ap- (*Turn to next page*)

Cavendish on Inflammable Air—*Cont'd*

plied. The mixtures were all tried in the same bottle and, as they were all ready prpared, before the inflammability of any of them was tried, the time elapsed between each trial was but small: by which means I was better able to compare the loudness of the sound in each trial. The result of the experiment is as follows:

Effect of Mixture with Air

With one part of inflammable air to 9 of common air, the mixture would not take fire, on applying the lighted paper to the mouth of the bottle; but on putting it down into the belly of the bottle, the air took fire, but made very little sound.

With 2 parts of inflammable to 8 of common air, it took fire immediately, on applying the flame to the mouth of the bottle, and went off with a moderately loud noise.

With 3 parts of inflammable air to 7 of common air, there was a very loud noise.

With 4 parts of inflammable to 6 of common air, the sound seemed very little louder.

With equal quantities of inflammable and common air, the sound seemeɑ much the same. In the first of these trials, namely, that with one part of inflammable to 9 of common air, the mixture did not take fire at once, on putting the lighted paper into the bottle; but one might perceive the flame to spread gradually through the bottle. In the three next trials, though they made an explosion, yet I could not perceive any light within the bottle. In all probability, the flame spread so instantly through the bottle, and was so soon over, that it had not time to make any impression on my eye. In the last mentioned trial, namely, that with equal quantities of inflammable and common air, a light was seen in the bottle, but which quickly ceased.

With 6 parts of inflammable to 4 of common air, the sound was not very loud: the mixture continued burning a short time in the bottle, after the sound was over.

With 7 parts of inflammable to 3 of common air, there was a very gentle bounce or rather puff: it continued burning for some seconds in the belly of the bottle.

A mixture of 8 parts of inflammable to 2 of common air caught fire on applying the flame, but without any noise: it continued burning for some time in the neck of the bottle, and then went out, without the flame ever extending into the belly of the bottle.

It appears from these experiments, that this air, like other inflammable substances, cannot burn without the assistance of common air. It seems too, that, unless the mixture contains more common than inflammable air, the common air therein is not sufficient to consume the whole of the inflammable air; whereby part of the inflammable air remains, and burns by means of the common air, which rushes into the bottle after the explosion.

Air from Different Metals

In order to find whether there was any difference in point of inflammability between the air produced from different metals by different acids, five different sorts of air, namely, 1. Some produced from zinc by diluted oil of vitriol, and which had been kept about a fortnight; 2. Some of the same kind of air fresh made; 3. Air produced from zinc by spirit of salt; 4. Air from iron by the vitriolic acid; 5. Air from tin by spirit of salt; were each mixed separately with common air in the proportion of 2 parts of inflammable air to 7 7/10 of common air, and their inflammability tried in the same bottle, that was used for the former experiment, and with the same precautions. They each went off with a pretty loud noise, and without any difference in the sound that I could be sure of. Some more of each of the above parcels of air were then mixed with common air, in the proportion of 7 parts of inflammable air to 3 1/5 of common air, and tried in the same way as before. They each of them went off with a gentle bounce, and burnt some time in the bottle, without my being able to perceive any difference between them.

In order to avoid being hurt, in case the bottle should burst by the explosion, I have commonly, in making these sort of experiments, made use of an apparatus contrived in such manner, that, by pulling a string, I drew the flame of a lamp over the mouth of the bottle, and at the same time pulled off the cap, while I stood out of the reach of danger. I believe, however, that this precaution is not very necessary; as I have never known a bottle to burst in any of the trials I have made.

The specific gravity of each of the above-mentioned sorts of inflammable air, except the first, was tried in the following manner. A bladder holding about 100 ounce measures was filled with inflammable air, in the manner represented in Fig. 3 and the air pressed out again as perfectly as possible. By this means the small quantity of air remaining in the bladder was almost entirely of the inflammable kind. 80 ounce measures of the inflammable air, produced from zinc from the vitriolic acid, were then forced into the bladder in the same manner: after which, the pewter pipe was taken out of the wooden cap of the bladder, the orifice of the cap stopt up with a bit of lute[1], and the bladder weighed. A hole was then made in the lute, the air pressed out as perfectly as possible, and the bladder weighed again.

. . . .

There seems no reason to imagine, from these experiments, that there is any difference in point of specific gravity between these four sorts of inflammable air; as the small difference observed in these trials is in all probability less than what may arise from the unavoidable errors of the experiment. Taking a medium therefore of the different trials, 80 ounce measures of inflammable air weigh 41 grains less than an equal bulk of common air. Therefore, if the density of common air, at the time when this experiment was tried, was 800 times less than that of water, which, I imagine, must be near the truth, inflammable air must be 5,490 times lighter than water, or near 7 times lighter than common air. But if the density of common air was 850 times less than that of water, then would inflammable air be 9,200 times lighter than water, or 10 8/10 lighter than common air.

Henry Cavendish was born at Nice, October 10, 1731, and died at his home in Clapham, England, February 24, 1810. After attending Cambridge University, he went to live with his father, Lord Charles Cavendish, in London. The son joined the father in scientific researches in almost all branches of physical science. They lived in seclusion, in a house nearly filled with apparatus for their experiments. Henry became a Fellow of the Royal Society at the age of 29. When he was 35 he presented before the society the first of his papers on chemical "airs," from which the above extract is taken.

---

[1]The lute used for this purpose, as well as in all the following experiments, is composed of almond powder, made into a paste with glue, and beat a good deal with a heavy hammer. This is the strongest and most convenient lute I know of. A tube may be cemented with it to the mouth of a bottle, so as not to suffer any air to escape at the joint; though the air within is compressed by the weight of several inches of water.

FIRST GLANCES AT NEW BOOKS

ODDITIES: A BOOK OF UNEXPLAINED FACTS—Rupert T. Gould—*Stokes* ($4). How did Orffyreus keep his wheel revolving for 54 days in a sealed room? What was it that repeatedly moved the coffins in the Chase vault at Barbados? What sort of a natural (or supernatural) creature was it that made the "devil's hoof marks" in Devonshire? What was the origin of Andrew Crosse's acari, that apparently developed electrically in an acid solution? Or, for that matter, do the Aurora Islands exist and, if so, where? These are some of the questions propounded by Lieutenant Commander Gould (R. N., retired) in this most interesting book. He does not offer any explanation of them; he merely states the facts and suggested explanations as shown by his own seemingly exhaustive researches. The reader can accept whatever explanation seems best, and on this account the book gains its chief charm. The author's frequent and genial digressions and his delightful footnotes all aid in making this one of the most fascinating books that has recently appeared.

General Science
Science News-Letter, December 1, 1928

WHY WE MISBEHAVE—Samuel D. Schmalhausen—*Macaulay* ($3). "Civilization, we now for the first time clearly perceive, is a state of psychopathology," writes this author. Psychiatry must come to the rescue. His discussions deal in psychoanalytic vein with maladjustments and readjustments. The point of view can be indicated by the fact that the book is dedicated to "Sigmund Freud, Alfred Adler, Carl Jung, three philosophic physicians who created the New Medicine, the New Psychology, and the New Education."

Psychiatry—Sociology
Science News-Letter, December 1, 1928

EMOTION AND DELINQUENCY—L. Grimberg—*Brentano's* ($3). A clinical study of five hundred delinquents who were brought to the neuropsychiatrist as medical problems. The author's view is that the psychopathological condition of such cases is due to organic inferiority, specifically a defective endocrine system. His analysis of causes of delinquency and outlining of individual cases from the doctor's point of view makes this book different from most works on the subject.

Psychiatry—Sociology
Science News-Letter, December 1, 1928

THE HISTORY OF BIOLOGY—Erik Nordenskiöld (tr. by L. B. Eyre)—*Knopf* ($6). In this book, a really serious effort is made to give not only the biographical outline but a critical evaluation of the work of each of the leading contributors to the growth of biological science. Prof. Nordenskiöld's book, therefore, stands in a class by itself when compared with the semi-popular publications which have hitherto had most of the field to themselves. It belongs on the shelves of the really serious student of biology.

Biology—History of Science
Science News-Letter, December 1, 1928

A BIRD BOOK FOR SOUTH AFRICAN CHILDREN—Dorothy L. Norman—*Juta and Co., Capetown* (5s. 6d.). Curious and beautiful birds we seldom hear about and never see, written up in a style that makes us wish that Miss Norman would come up to this side of the world and do a few books like it for the English-speaking children of the North.

Ornithology
Science News-Letter, December 1, 1928

BIOLOGY OF THE VERTEBRATES—H. E. Walter—*Macmillan* ($5). This is a textbook for college students, well done in the modern manner, with chief emphasis on physiology and evolution (it should sell well in Arkansas, though not through official channels)—not too professorial in tone, and illustrated, most sensibly, chiefly with line drawings.

Biology
Science News-Letter, December 1, 1928

A GUIDE TO THE STUDY OF FRESH-WATER BIOLOGY—J. G. Needham and P. R. Needham—*American Viewpoint Society* ($1). A hand-size pamphlet of systematic keys to the genera of fresh-water plants and animals, especially arthropods and algæ, illustrated with clear-cut line drawings.

Biology
Science News-Letter, December 1, 1928

A BRIEF COURSE IN BIOLOGY—W. H. Wellhouse and G. O. Hendrickson—*Macmillan*. A general biology text for college students, based on experience in handling the courses at Iowa State College. The material of the standard college course in biology is presented in much more compact form than is customary.

Biology
Science News-Letter, December 1, 1928

FOOTPRINTS OF EARLY MAN—Donald A. Mackenzie—*Blackie* (5s). Discoveries of prehistoric man in Europe and the east are discussed in this book very clearly, so that the reader who wants to learn rather than be amused will get a reasonably comprehensive view of the human family tree on that side of the world. Early Americans, while eqqually prehistoric with the Sumerians or with Britons of the New Stone Age, get no notice except for a page or two devoted to the discoveries that indicate antiquity of man in America. These the author describes as though unquestionably ancient, though the subject is still controversial in this country. Glozel is given considerable space and is finally pronounced "mysterious".

Anthropology
Science News-Letter, December 1, 1928

THE SEARCH FOR ATLANTIS—Edwin Bjorkman—*Knopf* ($2). New speculations as to the identity of the lost Atlantis. By a process of triangulation, this theory would establish the island of Scheria in the Odyssey, the farthest inhabited region to which Odysseus journeyed, as the same place as Tarshish, remote merchant city frequently mentioned in the Bible, and would prove this to be Atlantis. The overlapping of details regarding these three places is the basis of the theory.

Geography—Archæology
Science News-Letter, December 1, 1928

A CHILD'S STORY OF CIVILIZATION—Stephen King-Hall—*Morrow* ($3). A laudable attempt to present to the child a panorama of prehistory and history down to modern times, and to give some idea of the significance back of the events. For children of ten years or thereabouts, the author suggests that a "Helper", a sort of unofficial tutor, will be necessary to discuss the great ages of history with the child and to answer questions and devise games. The child's point of view is never lost sight of by this author who wrote the chapters originally for his young daughter.

History
Science News-Letter, December 1, 1928

HOW THE WORLD IS FED—F. G. Carpenter—*American Book Company* (96c). A very worthy addition to the well-known Carpenter series widely used in schools.

Economic Geography
Science News-Letter, December 1, 1928